WHAT IS CLAIMED IS:

1. A system for monitoring the harmonic content of the RF signal delivered to an RF powered device, comprising:

a voltage transducer adapted to sample the voltage of the RF signal and to output a first signal representative thereof;

a current transducer adapted to sample the current of the RF signal and to output a second signal representative thereof; and

a memory device in communication with at least one of said voltage transducer and said current transducer, said memory device containing calibration information specific to said at least one transducer.

2. The system of claim 1, wherein said memory device is in communication with each of said voltage transducer and said current transducer, and wherein said memory device contains calibration information specific to each of said voltage transducer and current transducer.

3. The system of claim 1, further comprising:

a controller in communication with said voltage transducer and said current transducer, said controller being adapted to modify the RF signal in response to an input from the voltage transducer or current transducer so as to minimize harmonic distortion.

4. The system of claim 1, wherein said first and second signals are first and second analog signals, and further comprising a digital converter adapted to convert said first and second analog signals to first and second digital signals, respectively.

5. The system of claim 1, wherein said RF powered device is a plasma reactor for semiconductor processing.

6. The system of claim 1, wherein said memory device is a non-volatile memory device.

7. The system of claim 1, further comprising a controller adapted to modify the RF signal in response to an input from both the voltage transducer and the current transducer so as to minimize harmonic distortion.

8. The system of claim 1, further comprising a digital signal processor.

9. The system of claim 1, further comprising:

an RF power source adapted to provide an RF signal to an RF powered device.

10. A system for monitoring the harmonic content of RF power delivered to an RF powered device, comprising:

an RF power source adapted to provide an RF signal to an RF powered device;

a voltage transducer adapted to sample the voltage of the RF signal and to output a first analog signal representative thereof;

a current transducer adapted to sample the current of the RF signal and to output a second analog signal representative thereof;

a converter adapted to convert said first and second analog signals into first and second digital signals;

a memory containing calibration information specific to said voltage and current transducers;

a digital signal processor in communication with said converter and said memory device, said processor being adapted to calibrate the first and second digital signals on the basis of the calibration information stored in the memory device and to perform a fast Fourier transform (FFT) on the calibrated signals; and

a controller in communication with said digital signal processor, said controller being adapted to monitor the calibrated signals and to modify the RF signal as necessary to minimize harmonic distortion;

wherein said controller outputs to said processor set up commands for the proper performance of the FFT, and wherein the processor outputs to the controller the results of the FFT.

11. A method for monitoring the harmonic content of an RF signal delivered by an RF power source to an RF powered device, comprising the steps of:

sampling the voltage and current of the RF signal and outputting, respectively, first and second analog signals representative thereof;

converting said first and second analog signals into first and second digital signals;

monitoring the first and second digital signals, and modifying the RF signal on the basis of the first and second digital signals as necessary to minimize harmonic distortion;

perform a fast Fourier transform (FFT) on the first and second digital signals; and

a memory device in communication with said digital signal processor, said memory device containing calibration information specific to said voltage and current transducers;

wherein said controller outputs to said processor set up commands for the proper performance of the FFT, and wherein the processor outputs to the controller the results of the FFT.

12. A method for monitoring the harmonic content of an RF signal delivered by an RF power source to an RF powered device, comprising the steps of:

sampling the voltage of the RF signal and outputting a first analog signal representative thereof;

sampling the current of the RF signal and outputting a second analog signal representative thereof;

converting said first and second analog signals into first and second digital signals;

monitoring the first and second digital signals, and modifying the RF signal on the basis of the first and second digital signals as necessary to minimize harmonic distortion;

perform a fast Fourier transform (FFT) on the first and second digital signals; and

a memory device in communication with said digital signal processor, said memory device containing calibration information specific to said voltage and current transducers;

wherein said controller outputs to said processor set up commands for the proper performance of the FFT, and wherein the processor outputs to the controller the results of the FFT.

13. A system for monitoring the harmonic content of delivered RF power, comprising:

a plasma reactor adapted to generate a plasma by the application of an input RF signal to a feed gas;

an RF power source adapted to provide an RF signal to said reactor;

a voltage transducer adapted to sample the voltage of the RF signal and to output a first analog signal representative thereof;

a current transducer adapted to sample the current of the RF signal and to output a second analog signal representative thereof;

a digital converter adapted to convert said first and second analog signals to first and second digital signals;

an analysis, control and communications (ACC) package in communication with said digital converter, said ACC package being adapted to monitor said first and second digital signals and to modify the RF signal as necessary to minimize harmonic distortion; and

a non-volatile memory device in communication with said digital signal processor, said memory device containing calibration information specific to said voltage and current transducers.

14. A method for measuring the power at the output of an impedance network coupled to a generator through a known impedance environment, comprising the steps of:

coupling to a voltage detector a signal representative of the voltage at the output of the impedance network to produce an RMS voltage signal;

coupling to a current detector a signal representative of the current at the output of the impedance network; and

processing the RMS voltage and RMS current signals to determine the power at the output of the impedance network.

15. The method of claim 14, further comprising the step of:

coupling to a voltage detector a signal representative of the voltage at the input of the impedance network to produce an RMS voltage signal.

16. The method of claim 15, further comprising the step of:

using the voltage at the input and output of the impedance network to calculate the difference in power between the input and output of the impedance network.

17. A system for measuring the power at the output of an impedance network coupled to a generator through a known impedance environment, comprising:

a first voltage detector coupled downstream of an impedance network and adapted to produce an RMS voltage signal;

a current detector coupled downstream of an impedance network and adapted to produce a signal representative of the current at the output of the impedance network; and

a second voltage detector coupled upstream of an impedance network and adapted to produce an RMS voltage signal.

18. A method for monitoring an RF powered device having an RF voltage and a self-bias voltage associated therewith, comprising the step of sampling the RF voltage and the self-bias voltage at the same point of measurement and via a DC coupling.

19. The method of claim 18, wherein the RF powered device is a plasma reactor.

20. The method of claim 18, wherein the RF voltage and the self-bias voltage are each sampled with a probe having first and second resistors R_1 and R_2, respectively, and wherein both the RF voltage and the self bias voltage are sampled according to the ratio $R_2/(R_1 + R_2)$.

21. The method of claim 20, wherein each of said first and second resistors is a high voltage, non-inductive resistor.

22. The method of claim 21, wherein a bias tee device is used to separate the RF self-bias component from the DC self-bias component.

23. A DC coupled voltage probe for monitoring an RF powered device having an RF voltage and a self-bias voltage associated therewith, comprising:

first and second non-inductive resistors; and

a bias tee adapted to separate the RF from the DC self-bias voltage component.

24. The probe of claim 23, wherein the probe is adapted to sample the RF voltage and the self-bias voltage at the same point of measurement.

25. The probe of claim 23, wherein said first and second resistors are high voltage resistors.

26. The probe of claim 23, wherein the RF powered device is a plasma reactor.

27. The probe of claim 23 in combination with an RF current carrier, and wherein the probe further comprising a spring which makes direct contact with the RF current carrier.

28. The probe of claim 27, wherein said spring comprises beryllium copper.

29. The probe of claim 27, wherein said spring is adapted to maintain press fit contact with said RF current carrier.

30. The probe of claim 23, further comprising bond pads adapted to provide connection to surface mount device outputs for RF voltage, DC voltage and ground.

31. A device suitable for detecting the voltage and current of an RF power source, comprising:

an RF voltage detector in communication with a DC coupled voltage transducer; and
an RF current detector in communication with an AC coupled current transducer.

32. The device of claim 31, in combination with a semiconductor processing device.

33. The device of claim 32, wherein said RF voltage detector and said RF current detector are adapted to sample the RF voltage and RF current, respectively, at the point of use.

34. The device of claim 31, wherein said RF voltage detector and said RF current detector are configured to detect peak values.

35. The device of claim 31, wherein said RF voltage detector and said RF current detector are configured to detect average values.

36. The device of claim 31, wherein said RF voltage detector and said RF current detector are configured to detect true RMS values.

37. A software program in combination with the device of claim 36, wherein said software is adapted to analyze the output of said RF voltage detector and RF current detector, and wherein said software is adapted to obtain calibration coefficients for said RF voltage detector and RF current detector.

38. A method for monitoring an RF power source, comprising the steps of:
detecting the RF voltage of the power source via a DC coupled voltage transducer; and
detecting the RF current of the power source via an AC coupled current transducer.

39. The method of claim 38, wherein said RF voltage and said RF current are sampled at the point of use.

40. The method of claim 38, wherein said RF voltage and said RF current are detected as peak values.

41. The method of claim 38, wherein The method of claim 801, wherein said RF voltage and said RF current are detected as average values.

42. The method of claim 38, wherein said RF voltage and said RF current are detected as true RMS values.

43. The method of claim 42, wherein the RF voltage and RF current are detected, respectively, by RF voltage and RF current detectors, and further comprising the step of obtaining the calibration coefficients for the RF voltage detector and the RF current detector.

44. The method of claim 43, wherein the calibration coefficients are used in the analysis of the signal outputs of the RF voltage detector and the RF current detector.

45. A device, comprising:

an RF current transducer; and

a housing for said transducer, comprising a metal top and metal side walls; wherein said housing is constructed such that, when it is placed on a planar substrate, said side walls slant away from said top and towards said substrate.

46. The device of claim 45, wherein said side walls are spaced apart from said top.

47. The device of claim 45, wherein said top is higher than said side walls.

48. The device of claim 45, wherein said top is supported by first and second end walls.

49. The device of claim 45, wherein said top wall is grounded.

50. The device of claim 45 in combination with an RF current carrier, wherein said device is located in magnetic proximity to said RF current carrier, and wherein said top is adapted to prevent crosstalk due to electric field interference from said RF current carrier.

51. The device of claim 45, wherein said side walls are adapted to isolate said transducer from ambient electric or magnetic fields.

52. The device of claim 45 in combination with an RF current carrier, wherein said side walls are disposed in such a way that they do not over attenuate the magnetic field associated with said RF carrier.